



How do you calculate spray booth airflow?

A properly designed and operating spray booth in a finishing facility is a major ingredient in the achievement of the finish required by the manufacturer. Either of the following two methods can analyze the proper airflow:

$$\frac{\text{Air Velocity (Feet per Minute – FPM)}}{\text{Air Volume (Cubic feet per Minute – CFM)}}$$

Prior to 1995, the National Fire Protection Association (NFPA) book 33 listed the proper airflow for spray booths using non-electrostatic spray equipment at 100 FPM. That was determined to be adequate flow for the protection of the operator. Current regulations stipulate the proper flow is:

The air volume required to dilute solvent concentration below 25% of Lower Flammable Limit (LFM).

This can either be calculated using all the booth parameters, paint flow, paint characteristics and spray gun efficiency, or purchase test equipment which is designed for specific solvents. Most facilities do not have the equipment or the expertise to determine the solvent concentration in the booth and still rely on the 100 FPM guideline.

To calculate the amount of exhaust air needed for the booth, a simple calculation is used:

CFM = Booth Face Area in square feet multiplied by the required flow (typically 100 FPM)

For example, an 8' x 10' filter bank (80 square feet) would require an exhaust of 8000 CFM (100 X 80) to achieve the required 100 FPM velocity.

To calculate the existing velocity knowing the exhaust volume the following formula is used:

Velocity = Exhaust in CFM divided by the booth filter area.

For example, a fan that exhausts 9000 CFM with a 10' x 10' filter bank would have a velocity of 90 FPM.

Proper airflow is not only necessary for the protection of the operator but is necessary to achieve the desired finish quality. Flow that is too low will not draw the overspray to the filters. Much of the overspray will end up on the part as dry spray (rough finish). If the flow is too high, solvents tend to evaporate too quickly resulting in dry spray.

